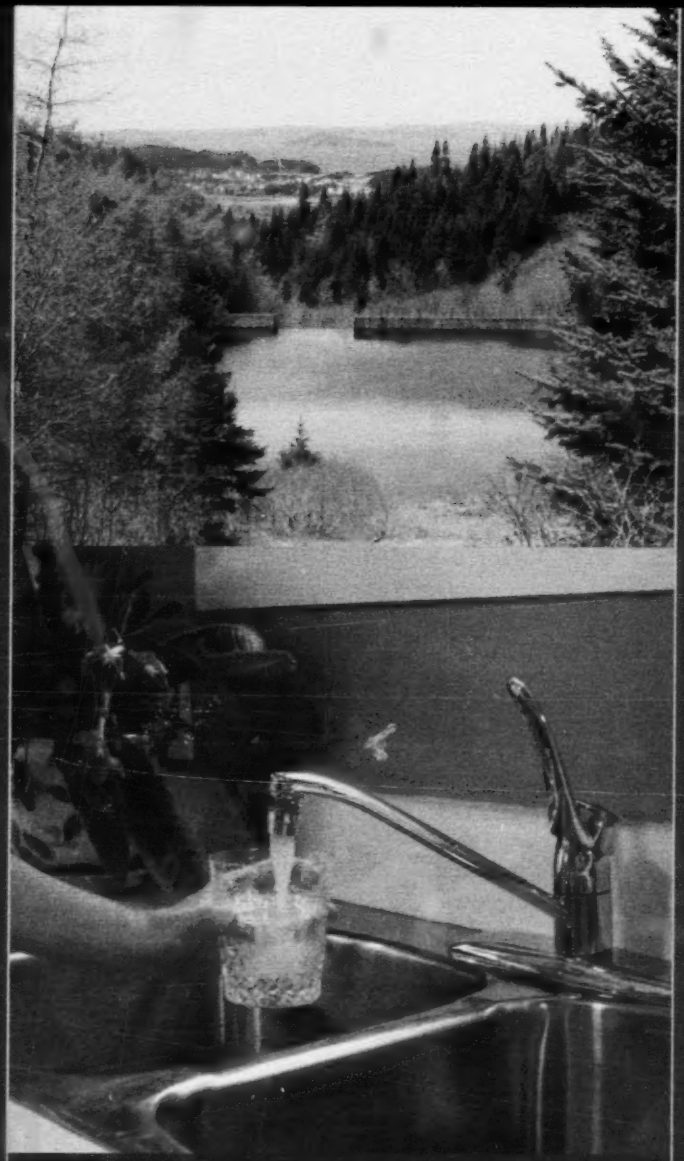

Drinking Water Safety in Newfoundland and Labrador

Annual Report 2010

Newfoundland Labrador

Environment and Conservation

Drinking Water Safety
in
Newfoundland and Labrador

Annual Report 2010

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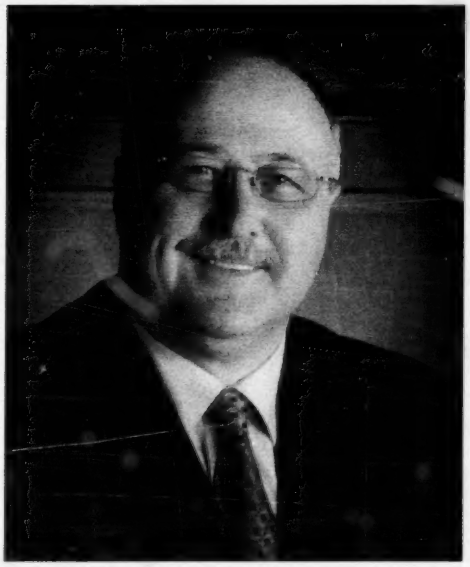
Message from the Minister

As the Minister for the Department of Environment and Conservation, I am pleased to present the annual Drinking Water Safety in Newfoundland and Labrador report for 2010. This annual report outlines the accomplishments and activities for 2009–10 under the Multi-Barrier Strategic Action Plan. The province of Newfoundland and Labrador adopted a Multi-Barrier Strategic Action Plan in 2001 to ensure the safety of drinking water for residents of Newfoundland and Labrador. This strategy is considered to be the most effective method of managing drinking water systems.

In 2008, the department announced the Rural Drinking Water Safety Initiative, which was specifically designed to deal with drinking water issues in small and very small communities in the province. The Government has made significant progress during the 2009–10 year, with the development of design guidelines for potable water dispensing units and guidance on operation and maintenance of drinking water systems.

I would like to thank the staff of the Water Resources Management Division for their hard work and commitment to ensuring the safety of drinking water in this province. I commend the efforts of the Technical Working Group, which encompasses the Departments of Environment and Conservation, Government Services, Municipal Affairs, and Health and Community Services, as well as the province's regional Health Authorities.

Most importantly, I would like to acknowledge the hard work of municipal governments in the provision of high quality drinking water to their citizens.



Honourable Ross Wiseman
Minister of Environment and Conservation

Executive Summary

This is the ninth annual report prepared by the Department of Environment and Conservation, Government of Newfoundland and Labrador. The annual report is prepared to communicate how the Government of Newfoundland and Labrador is protecting the province's drinking water quality. This report describes the initiatives, activities, highlights, and accomplishments of the various departments in carrying out the Multi-Barrier Strategic Action Plan (MBSAP) for the 2009–10 fiscal year (April 1, 2009 to March 31, 2010).

The first section of the report focuses on Level I of the MBSAP. This level includes source protection, drinking water treatment, and drinking water distribution. There are 502 public water supply sources in the province, 317 of which are protected under Section 39 of the *Water Resources Act*. 194 municipalities in the province of Newfoundland and Labrador use water from protected drinking water sources. 23 water treatment plants are in operation in Newfoundland and Labrador (7 of which are potable water dispensing units). In 2009–10, 9 water treatment systems were upgraded with new chlorination equipment. 52 applications for potable water dispensing units (PWDUs) funding were received, and at the end of the 2009–10 fiscal year, 23 of these applicants were being considered to have PWDUs installed in the 2010–11 fiscal year.

The second section of this report focuses on Level II of the MBSAP. This level includes monitoring of the province's drinking water quality, inspection and enforcement, data management and reporting, operator education, training, and certification, and corrective measures.

A few of the many items highlighted in this section are:

- analysis of 3,838 inorganic and disinfection by-product samples
- analysis of 20,967 bacteriological water quality samples
- publication of 1,063 seasonal drinking water quality reports, and 319 annual reports
- preparation of 132 permits dealing with water supply and water and sewer systems
- recognition of the 296 certified water and/or wastewater operators working in the province
- administration of 207 on-site training sessions

The third section of this report focuses on the final level of the MBSAP. Level III is composed of legislation and policy frameworks, public involvement and awareness, guidelines, standards and objectives, and research and development. This section of the report discusses the stakeholders involved in the implementation of the MBSAP, such as the different levels of government and the public. In addition, it defines the legislation that governs drinking water quality and infrastructure in the province of Newfoundland and Labrador. Highlights include accomplishments of the Interdepartmental Safe Drinking Water Technical Working Group, the Department of Environment and Conservation's efforts to increase public involvement and awareness of drinking water quality and related issues in the province, new initiatives, and research and development projects that the province has been working on throughout the 2009–10 fiscal year.

The Path Forward section of the report outlines the Government of Newfoundland and Labrador's plans for the 2010–11 fiscal year. The Government of Newfoundland and Labrador remains committed to ensuring the safety of the province's drinking water through action at all levels of the MBSAP. The Departments of Environment and Conservation, Government Services, Health and Community Services, and Municipal Affairs work collaboratively to achieve the goals of the MBSAP, and to enforce regulations and guidelines regarding drinking water safety. Each department contributes uniquely to the safety of drinking water across the province. The implementation of the Rural Drinking Water Safety Initiative for Newfoundland and Labrador will continue throughout the 2010–11 fiscal year.

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Newfoundland and Labrador *Water Resources Act* SNL 2002 cW-4.01
www.assembly.nl.ca/Legislation/sr/statutes/w04-01.htm

Water Resources Management Division Reports and Publications
http://www.env.gov.nl.ca/env/waterres/reports/index.html

Evaluation of Existing Potable Water Dispensing Units and Recommendations for Design and Operational Guidelines
http://www.env.gov.nl.ca/env/waterres/reports/drinking_water/093017_00_PWDU_Study_FINAL_REPORT.pdf

Protected Water Supply Area List and GIS Layers
http://www.env.gov.nl.ca/env/waterres/gis/index.html

Guidelines for Canadian Drinking Water Quality: Summary Table
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2010-sum_guide-res_recom/index-eng.php

Standards for Bacteriological Quality of Drinking Water
http://www.env.gov.nl.ca/env/waterres/regulations/policies/standards_microbiological.html

Standards for Chemical and Physical Monitoring of Drinking Water
http://www.env.gov.nl.ca/env/waterres/regulations/policies/physical_monitoring.html

Policy for Drinking Water Quality Monitoring and Reporting for Public Water Supplies
http://www.env.gov.nl.ca/env/waterres/regulations/policies/water_quality.html

Department of Environment and Conservation Drinking Water Quality Data
http://www.env.gov.nl.ca/env/waterres/quality/drinkingwater/chemical.html

WRMD Acts, Regulations, Policy Directives, and Water Quality Standards
http://www.env.gov.nl.ca/env/waterres/regulations/policies/index.html

"What's New" The latest information posted by Water Resources Management Division
http://www.env.gov.nl.ca/env/waterres/whatsnew/index.html

Operator Education, Training, and Certification
http://www.env.gov.nl.ca/env/waterres/training/index.html

Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems
http://www.env.gov.nl.ca/env/waterres/waste/groundwater/report.html

Best Management Practices for the Control of Disinfection By-products in Drinking Water Systems in Newfoundland and Labrador
http://www.env.gov.nl.ca/env/waterres/reports/cwws/index.html

Introduction

This is the ninth annual report prepared by the Department of Environment and Conservation (ENVC), to communicate how the Government of Newfoundland and Labrador is protecting the province's drinking water quality. This report highlights the initiatives, activities, and accomplishments made by the departments that carried out the Multi-Barrier Strategic Action Plan (MBSAP) in the 2009–10 fiscal year (April 1, 2009 to March 31, 2010). The report describes the three levels of the MBSAP and their various components. It illustrates how Government is implementing the MBSAP, and describes the intended path forward, and plans for future implementation of the MBSAP.

Clean & Safe Drinking Water

The Government of Newfoundland and Labrador is committed to providing clean and safe drinking water to the people of the province. To achieve this goal, it uses a preventative risk management approach, the MBSAP. The MBSAP identifies all known and potential hazards and ensures barriers are in place to reduce or eliminate the risk of contamination and other impairments (aesthetic) to water quality.

The Multi-Barrier Strategic Action Plan is considered to be the most effective method of managing drinking water systems and has been implemented throughout Canada. The Multi-Barrier Strategic Action Plan has three levels, as illustrated in Figure 1.

The implementation of the MBSAP involves the collaborative efforts of four provincial government departments:

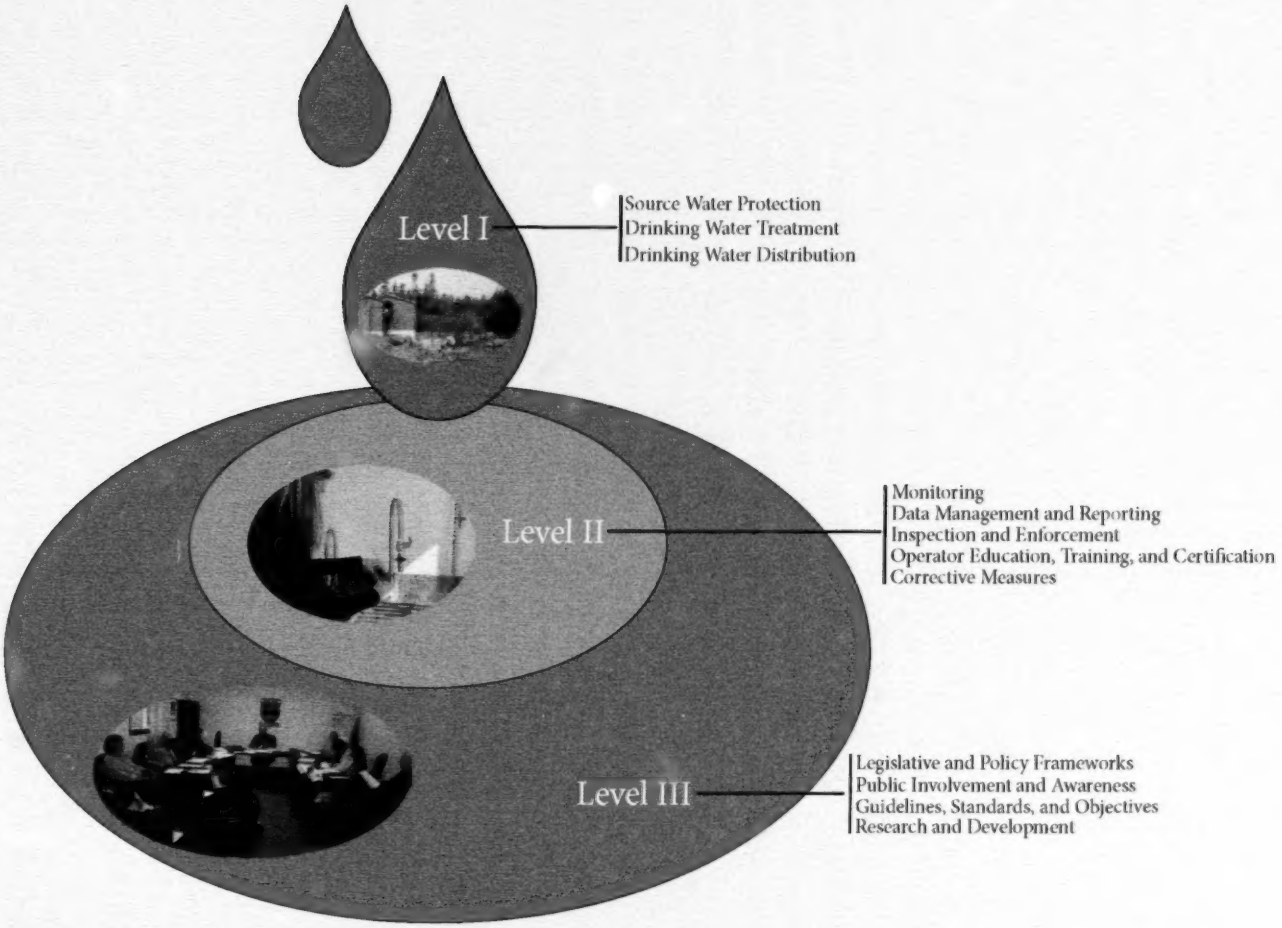
1. Environment and Conservation (acting as the lead agency)
2. Government Services
3. Health and Community Services
4. Municipal Affairs

How does the Department of Environment and Conservation monitor the effectiveness of the Multi-Barrier Strategic Action Plan?

In this report, indicators are reported for various components of the MBSAP. This information, which is collected and analyzed over time, can identify status and trends in the application of the various barriers of the MBSAP. These indicators of performance, help ENVC identify gaps in the MBSAP that need to be addressed. Some examples of indicators are:

- the number of protected public water supply areas in the province
- the number of land use referrals within protected public water supply areas
- the number of watershed management committees
- the number of drinking water treatment and disinfection systems
- the amount of funding provided by the Department of Municipal Affairs for water infrastructure projects
- the number of boil water advisories issued
- the number of samples scheduled and the number of samples actually collected for the fiscal year
- the number of bacteriological and chemical water quality exceedances
- the number of drinking water quality reports published
- the number of regulatory permits issued
- the number of regulatory inspections performed
- the number of certified water and/or wastewater system operators
- the number of education and on-site training seminars conducted by ENVC
- the number of participants at the Annual Drinking Water Safety Workshop
- the number of corrective measures undertaken
- the number of new or revised legislation, standards, or guidelines for the protection of drinking water quality

Figure 1: The Multi-Barrier Strategic Action Plan



Level I

The components of the first level of the MBSAP protect drinking water from the source to the tap.

The three components of level I of the MBSAP are:

1. source water protection
2. drinking water treatment
3. drinking water distribution

Source Water Protection

Protecting public drinking water sources is the first step in maintaining a supply of clean and safe drinking water for communities. The province of Newfoundland and Labrador has one of the most widely adopted and well-established source water protection programs in Canada.

Public water supplies in the province come from two types of sources: surface water (rivers, ponds, and lakes) and groundwater (drilled and dug wells). Each source type presents its own set of risks and potential hazards that can contaminate drinking water.

Section 39 of the *Water Resources Act*, SNL 2002 cW-4.01 protects public drinking water sources. These areas are classified as protected public water supply area(s) for surface water supplies, and wellhead protected water supply area(s) for groundwater supplies. Establishing protection is a cooperative process that is initiated by individual communities. The Water Resources Management Division is making efforts to increase the number of wellhead protected water supply areas in the province. Strategies include a survey and letter campaign, coupled with site visits as part of its source sampling and public water supply well inspection efforts.

Figure 2 shows that there are 502 public water supply sources in the province of Newfoundland and Labrador. Of these, 304 are surface water sources and 198 are groundwater sources. In total, 317 sources are designated as protected public water supply areas (PPWSAs). One new public groundwater supply was developed this year, and it was designated as a protected supply. No new surface water supplies gained protected status this fiscal year. One protected public water supply was repealed because it was no longer being used as a water supply for the community.

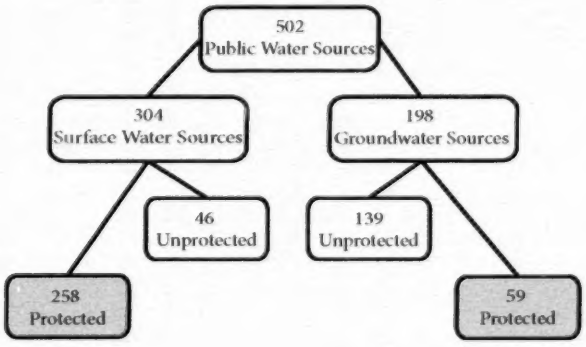
Source protection of drinking water helps protect public health and reduces the cost involved in treating public drinking water supplies.

The Department of Environment and Conservation encourages all communities to begin the protection process for their water supplies.

In 2009–10:

- 85 percent of public surface water supplies are protected
- 30 percent of public groundwater supplies are protected

Figure 2: Public Water Sources in Newfoundland and Labrador: 2009–10



The Department of Environment and Conservation encourages all communities to initiate the protection process for their water supplies.

Watershed Management

The Water Resources Management Division (WRMD) of the Department of Environment and Conservation regulates development activities within protected public water supply areas. The division uses a number of tools to monitor such activities, including:

- referrals from the Interdepartmental Land Use Committee (ILUC), Crown Lands, Natural Resources, and Municipal Affairs
- permits for development
- watershed management committees

Referrals

In the 2009–10 fiscal year, the WRMD processed 131 referrals from various departments relating to proposed activities within PPWSAs, as outlined below.

Type of Referral	Count
Crown Land	83
Interdepartmental Land Use Committee	25
Municipal Affairs	10
Natural Resources	8
Other	5
Total	131

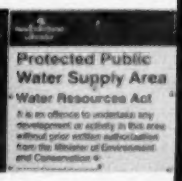
If activities are within a PPWSA, the WRMD provides recommendations to the respective department(s) and requests that an application be submitted to the division, as per regulatory requirements. The purpose is to control the development or activity inside the designated boundary of a PPWSA to ensure that it will have either no impact or minimal impact on drinking water quality and/or quantity.

Development Permits

All activities in a PPWSA (either a protected public water supply area, or a wellhead protected water supply area) must be permitted, the owner of an activity in a PPWSA must apply for a permit.

Development permit applications submitted to other provincial departments must be referred to the WRMD to ensure that a proposed activity is not located in a protected public water supply area.

As of March 31, 2010, 194 municipalities in the province had PPWSAs. The total number of towns (including Local Service Districts) with PPWSAs was 258.



Is Your Community's Drinking Water Supply Protected?

If your community's drinking water supply area is not protected, you can encourage your council/Local Service District to submit an "Application for Protection of a Water Supply Area" to the Water Resources Management Division of the Department of Environment and Conservation. The steps in the designation process are outlined in a document prepared by the Department of Environment and Conservation, "Management of Protected Public Water Supply Areas" (2006), which is available on the department's website at: *http://www.env.gov.nl.ca/env/waterres/cycle/surfacewater/designation_process_booklet.pdf*

The application forms are also available from the regional offices of the Department of Environment and Conservation, and on the department's website at: *http://www.env.gov.nl.ca/env/waterres/regulations/appforms/index.html* Your municipality or committee can use these publications to assist in the designation process, or you can call the department's nearest regional office and request assistance from an Environmental Scientist.

All developments in protected public water supplies must have a permit for a development activity in a protected public water supply area or wellhead protected water supply area.

Under the *Water Resources Act* for the 2009–10 fiscal year, 132 development permits were issued:

- 114 permits for development in a Surface PPWSA under Section 39
- 12 permits for development in a Surface PPWSA issued jointly under Section 39 and Section 48
- 4 permits for development in a Surface PPWSA issued jointly under Section 39 and Section 37
- 2 permits for development in a Groundwater PPWSA under Section 39 and Section 37

Figure 3 illustrates the distribution of these permits by section.

Watershed Management Committees

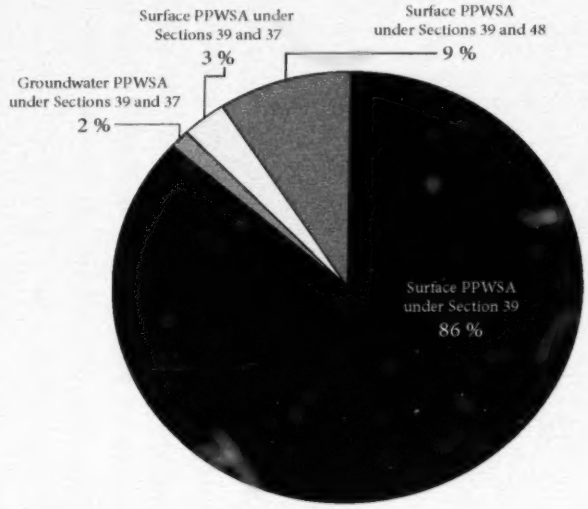
Watershed management committees are formed to oversee land use management, development issues, and activities inside the PPWSA. Stakeholders on such committees typically include town council members, town residents, representatives from industry involved in development activities in the area, Department of Environment and Conservation staff, members of environmental groups, and other concerned parties. The five active watershed management committees in the province during 2009–10 were located in:

- Clarenville
- Corner Brook
- Gander
- Grand Falls–Windsor
- Steady Brook

Drinking Water Treatment

Drinking water treatment refers to the processes that remove contaminants or adjust aesthetic parameters in source water, by the addition of chemicals, filtration, and/or other processes to satisfy drinking water quality guidelines. Each water source in the province has unique water chemistry, and potential for contamination according to its location, and the development activities within its watershed area. Several water treatment strategies are used in the province to address the different scenarios, and provide unique solutions to treat the water consumed.

Figure 3: Distribution of Development Permits by Section


Surface PPWSA under Sections 39 and 37
3 %
Surface PPWSA under Sections 39 and 48
9 %
Groundwater PPWSA under Sections 39 and 37
2 %
Surface PPWSA under Section 39
86 %

Disinfection

The most critical aspect of water treatment is disinfection. Many forms of disinfection can be used in the treatment of drinking water. Chlorination, however, is recognized as the most feasible and practical disinfectant. It is used in its three forms (powder, liquid, and gas) by communities across the province throughout their water distribution systems. When used in drinking water treatment, chlorine disinfects water and minimizes microbial growth in the water distribution system. Chlorine can also create disinfection by-products (DBPs) such as trihalomethanes (THMs) and haloacetic acids (HAAs). While minimizing disinfection by-products is important, the risks of not disinfecting drinking water far outweigh any risks DBPs may cause. To ensure that drinking water remains safe,

The most critical aspect of water treatment is disinfection. No other water treatment is used or should be used to the point where it compromises disinfection.

In 2009–10:

- there are 443 chlorination systems in the province
- there are 4 new installations of chlorination equipment, and 9 upgrades of existing equipment

it is essential that the optimal level of chlorine is maintained throughout the system. Chlorination is the most commonly used disinfection method in the province. Alternative methods are also used, as outlined below:

Disinfection Systems	Number of Systems
Chlorination Systems	443
Ultraviolet Light (UV)	30
Mixed Oxidants (MIOX)	4
Ozone	3
Chloramine	2

Parameter Specific Drinking Water Treatment

Mitigative measures have been implemented in numerous drinking water systems to alleviate parameter specific water quality challenges. Although not full-scale treatment plants, the following corrective measures have been implemented throughout the province:

- screening (intake screens, infiltration gallery)
- filtration
- pH adjustment

Drinking Water Treatment Systems	Number of Systems
pH adjustment	45
Micron/pressure filters	22
Infiltration galleries	18
Arsenic removal	9
Iron/Manganese removal	7
Lead removal	1

Water Treatment Plants

As of March 31, 2010, 23 water treatment plants are in operation in Newfoundland and Labrador. They use a range of treatment processes in addition to disinfection. 7 of them are full-scale conventional treatment plants, designed to improve the quality of raw source water using coagulation, flocculation, sedimentation, and filtration. In some locations, additional treatment is required because of site-specific water quality problems. If a water treatment plant is deemed necessary to ensure water quality, municipalities must assess and implement a cost effective solution to water quality issues. The Departments of Environment and Conservation and Municipal Affairs have developed a procedure for municipalities when they are considering a water treatment plant. Under this procedure, the municipality establishes a working committee to oversee the technical and administrative aspects of the selection and implementation process. This committee will consist of representatives from the town council, ENVC and the Department of Municipal Affairs. The municipality may also engage an engineering consultant to aid in selecting an appropriate water treatment technology and in administering its construction. An initial review of at least six technologies is required. This stage involves a review of: water quality data, the extent and nature of water quality issues, water usage, design flows, the initial capital cost, and ongoing operations and maintenance costs of the various treatment options. From this review, three of the technologies are selected for a more detailed review, which will include the operation of a pilot plant over a

Water Treatment Plant Type	Count
Conventional	7
Potable water dispensing unit	7
Semi-conventional	2
Membrane	2
Filtration systems	2
Other treatment plants	3
Total	23

While minimizing disinfection by-products is important, the risks of not disinfecting water far outweigh the risks created by disinfection by-products.

set period of time. Following the piloting phase, the best available technology that meets water quality objectives for water treatment, and has the lowest costs over the life of the system will be recommended by the working committee. Prior to the approval of funding for the recommended treatment process, the municipality must obtain the approval of the Departments of Municipal Affairs and ENVC.

A full-scale water treatment plant is not a feasible solution for all communities. An alternative solution to the treatment challenge for smaller communities is the use of small-scale drinking water treatment systems; potable water dispensing units (PWDUs), which are configured for treatments that respond to a community's specific drinking water quality issues.

Drinking Water Distribution

The distribution system is the largest component of physical infrastructure that ensures drinking water safety. It includes all the pipes, valves, service lines, pumping stations, fire hydrants, and storage facilities required to deliver clean and safe drinking water.

Water distribution systems vary in size and type throughout the province. The Atlantic Canada Waterworks Voluntary Certification Board classifies water distribution systems according to the size of the population they serve. Most public water distribution systems in Newfoundland and Labrador fall into the "very small" classification, as they serve populations of 500 or fewer people.

In the 2009–10 fiscal year there were 540 public water distribution systems in Newfoundland and Labrador.

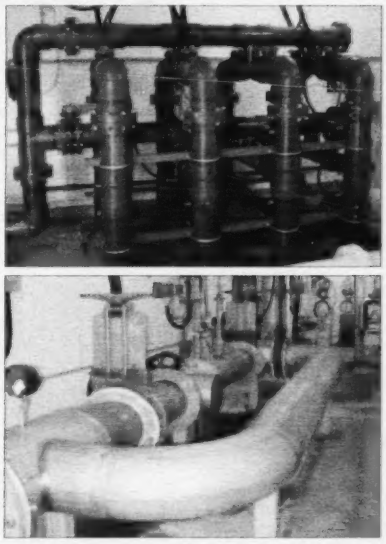
Water Distribution System	Population Served	Count
Very Large	> 50,000	1
Large	15,001 - 50,000	2
Medium	1,501-15,000 people	41
Small	501- 1,500 people	83
Very Small	≤ 500 people	392
Unknown	variable	21
Total		540

Very small systems face two major challenges:

1. Operation and maintenance: Successful ongoing operation and maintenance includes employing and retaining qualified and trained operators. This can be difficult in rural areas that are experiencing changing demographics.
2. Administration: Many communities with small systems, serve small populations spread over large geographic areas, which increases the challenges associated with providing safe drinking water and maintaining the water supply systems.

To address these challenges, the province continues to encourage the implementation of regional water systems and regional water operators wherever needed and feasible.

Regardless of the size of the distribution system, ongoing infrastructure maintenance is required to ensure both reliable hydraulic capacity and safe drinking water. Proper maintenance depends on operator knowledge and adherence to best management practices and operational procedures. The Department of Environment and Conservation addresses this requirement through its Operator Education, Training, and Certification (OETC) program.

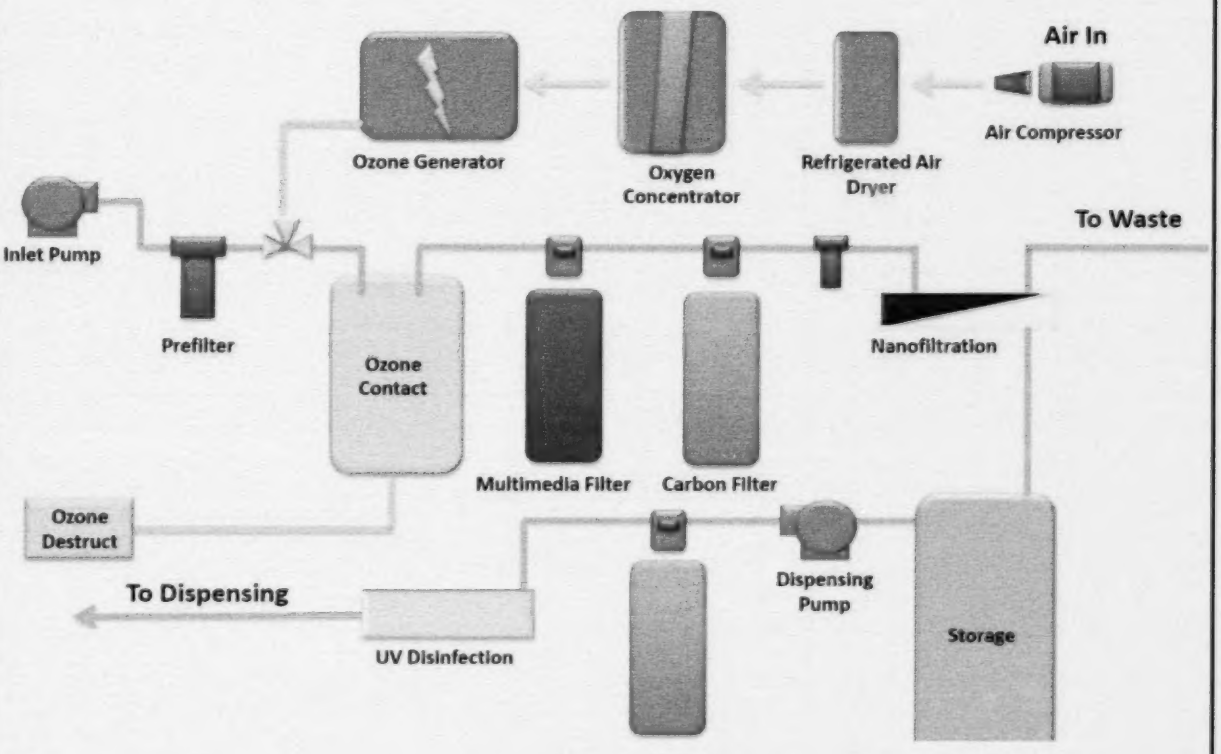


Drinking water distribution piping

Status of Potable Water Dispensing Units in Newfoundland and Labrador

Several advances were made in the province's program for the installation of potable water dispensing units (PWDUs) or small scale drinking water treatment systems during the 2009–10 fiscal year:

- a new PWDU was commissioned in the Town of Gaultois (summer 2009)
- a consultant was hired to evaluate the design and operation of the 6 existing PWDUs and recommend improvements in design for similar systems to be installed in the future; a report is posted at *http://www.env.gov.nl.ca/env/waterres/reports/drinking_water/093017_00_PWDU_Study_FINAL_REPORT_df_*
- the Department of Municipal Affairs received 52 applications for PWDU funding by the end of the fiscal year; of these, 23 towns have committed to having PWDUs installed
- regular monitoring of drinking water quality from PWDUs by the Departments of Environment and Conservation and Government Services began in the spring of 2009; drinking water from PWDUs is of significantly higher quality than that achieved at household taps



Proposed PWDU Schematic

Study of Operation and Maintenance of Drinking Water Infrastructure in Newfoundland and Labrador

The responsibility for the operation and maintenance (O&M) of drinking water infrastructure (which includes intakes, distribution pipes, water storage tanks, pumps, and water treatment plants) becomes the primary responsibility of a community after the province has helped pay for the capital costs. Poor O&M of drinking water systems can lead to frequent boil water advisories and other drinking water quality issues, substandard service to consumers, shortened useful life of infrastructure, and increased costs to communities and the province.

In 2009, WRMD hired a consultant to study the operation and maintenance of drinking water infrastructure in Newfoundland and Labrador, in order to identify issues with current O&M practices and to make recommendations for improvements. The study identified several areas of concern:

- local service districts are more vulnerable than municipalities to having drinking water quality issues that result from lack of proper O&M
- the lack of a back-up operator hinders training opportunities for the full-time operator
- full cost recovery is often not possible because of current water rates
- operator effort is considerably less than required to meet best management practices
- there is a significant discrepancy between the average operator salary in the province and in other jurisdictions
- drinking water systems are often more technically complex than necessary

The study also noted that the useful life of existing infrastructure could be extended considerably with proper O&M, which would in turn reduce capital costs. Recommendations included:

- regionalize more drinking water systems or their operation
- consider public-private partnerships for the operation of drinking water systems
- improve the design of infrastructure systems to reflect communities' abilities
- develop O&M manuals or standard operating procedures for communities
- increase training and certification of operators
- increase operating funds and operator wages
- provide back-up operators

Operators maintain a fire hydrant in Rocky Harbour

Proper maintenance prolongs the life of a water distribution system and reduces the frequency of leaks and breaks. Nevertheless, at some point repairs and replacements are necessary, and the financial cost can be substantial. During the 2009–10 fiscal year, the Department of Municipal Affairs spent $78.6 million on water and wastewater infrastructure projects in the province. These funds went to capital works programs and studies. In addition, Municipal Affairs contributed $215,000 to the Department of Environment and Conservation's Drinking Water Safety Initiative.

Level II

The second level of the MBSAP includes the distribution of clean and safe drinking water. The standard of performance achieved in Level I of the MBSAP is verified through the components of Level II, increasing overall protection of the province's drinking water.

The five components in Level II of the MBSAP are:

1. monitoring
2. data management and reporting
3. inspection and enforcement
4. operator education, training, and certification
5. corrective measures

In addition to its province-wide monitoring activities, the Department of Environment and Conservation's Water Resources Management Division also designs special monitoring programs to address site-specific characteristics and/or emerging water quality issues. Communities are encouraged to monitor specific water quality parameters themselves for operational purposes in water treatment plants, or if a specific parameter is of local concern.

Long-term monitoring of drinking water quality has many benefits, including identifying trends and changes in a community's water quality. Long-term monitoring allows the Government of Newfoundland and Labrador to identify issues and determine if source protection needs to be reviewed or corrective measures introduced or revised. The extensive monitoring program for drinking water quality in the province is a joint responsibility shared by the Departments of Environment and Conservation and Government Services.

- in 2008–09, 18,836 public water supply samples were tested for bacteriological parameters
- in 2009–10, an additional 2,131 public water supply samples were tested for bacteriological parameters
- the 2009–10 total (20,967) represents an 11.3% increase in bacteriological samples tested from one fiscal year to the next

This section of the report outlines Government's activities in each of the Level II components during the 2009–10 fiscal year.

Monitoring

Drinking water quality monitoring consists of regular sampling of drinking water from both the source and the tap. The purpose of collecting drinking water samples is to test for parameters of concern that may affect human health or the aesthetic quality of drinking water throughout the province.

As part of the drinking water quality monitoring program, ENVC and the Department of Government Services measure free and total chlorine residuals in tap water at each sampling location.

- **the number of BWAs in effect, in the province on March 31, 2010, are 218**
- **the number of communities affected by these BWAs on March 31, 2010, are 157 with an affected population of 57,185**

Bacteriological Water Quality

Under the direction of the Department of Government Services, Environmental Health Officers collect tap samples from public drinking water supplies for analysis of bacteriological parameters. The parameters monitored include total coliforms and *Escherichia coli* (*E. coli*). During the 2009–10 fiscal year, 20,967 bacteriological samples were collected from public drinking water supplies in the province.

Region sampled	Count
St. John's Region	8,243
Western Region	5,153
Central Region	4,513
Eastern Region	1,577
Labrador Region	1,481
Total	20,967

Bacteriological Parameters: Analysis

The provincial public health laboratory analyzes samples for bacteriological parameters. Samples are also tested at its affiliated regional testing locations. The province compares the results to its own bacteriological standards (outlined in *Standards for Bacteriological Quality of Drinking Water*).

Boil water advisories are preventative measures for protecting public health from waterborne microbiological contamination.

Bacteriological Parameters: Results

Based on the analysis of bacteriological parameters for public drinking water samples taken during the 2009–10 fiscal year, 1,222 were found to be unsatisfactory in terms of total coliforms.

Region Tested for Total Coliforms	Unsatisfactory Samples
Central Region	589
Western Region	346
St. John's Region	158
Eastern Region	85
Labrador Region	44
Total	1,222

There were 212 bacteriological samples tested that were found to be unsatisfactory in terms of *E. coli*.

Region Tested for *E. coli*	Unsatisfactory Samples
Western Region	76
Central Region	48
Labrador Region	45
St. John's Region	26
Eastern Region	17
Total	212

Boil Water Advisories

Boil water advisories (BWAs) are preventative measures for protecting public health from waterborne microbiological contamination that may, or are known to be present in drinking water. A boil water advisory is issued when water quality is questionable due to operational deficiencies (such as inadequate chlorine residual) or the water in a community's water system is contaminated with fecal pollution indicator organisms (such as *Escherichia coli*).

Boil water advisories are issued for a variety of reasons and can be either short or long term. When discussing BWAs for the purpose of this annual report, we are referring to BWAs in effect at the end of the fiscal year, March 31, 2010.

Figure 4 shows a historical comparison of BWAs per end of the fiscal year. On March 31, 2010, 218 BWAs were in effect, affecting 157 communities in the province. Figure 5 illustrates the distribution of BWAs by reason, used to issue the advisory. Figure 6 illustrates the distribution of long term BWAs by reason. Long term BWAs are BWAs that have been in effect for a period of five years or greater. A total of 146 BWAs have been in effect for a period of five years or greater at the end of the 2009–10 fiscal year.

As seen in Figure 5, the highest percentages of BWAs exist due to the water supply not having a disinfection system, or no free chlorine residual detected in the water distribution system. As seen in Figure 6, long term BWAs (greater than 5 years in duration) tend to exist for the same reasons.

Figure 4: Number of BWAs and Number of Communities Affected

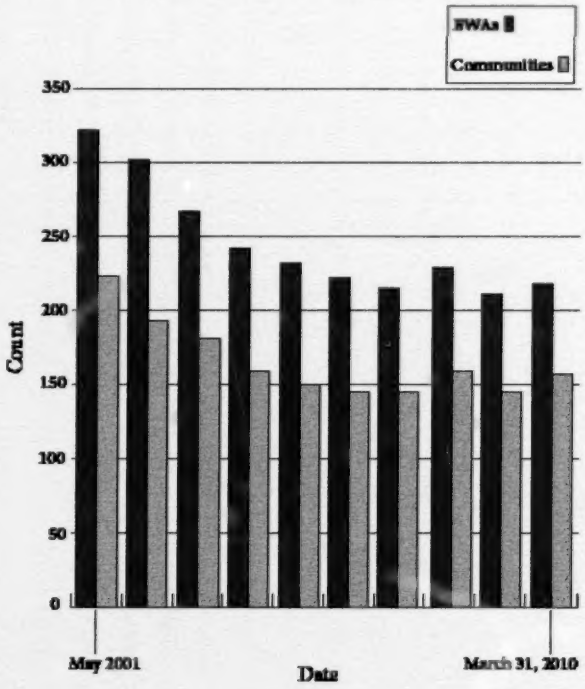


Figure 5: Distribution of BWAs by Reason

Reason for BWAs (Code)	Percentage of Total BWAs	Distribution
Water supply has no disinfection system (A)	21.6	
No free chlorine residual detected (E2)	17.4	
Disinfection system is off (C1)	13.3	
Multiple reasons (any combination of codes)	11.5	
No free chlorine residual of 0.3 mg/L after 20 min. contact time (E1)	10.5	
Maintenance or repairs to water distribution system (D1)	5.5	
Total coliforms detected and confirmed in repeat sample (F3)	5.0	
Chlorination system is off due to lack of funds to operate (B3)	4.1	
Chlorination system is off due to taste/aesthetic considerations (B1)	3.7	
A cross-connection is discovered in the distribution system (D2)	2.7	
E. coli detected, repeat samples cannot be taken (F2)	1.4	
Chlorination system is turned off due to perceived health risks (B2)	0.9	
E. coli detected in initial sample(s) and other known problems (F4)	0.9	
Insufficient residual disinfectant in water system (E3)	0.5	
Total coliform detected and repeat samples cannot be taken (F2T)	0.5	
Water supply system integrity compromised due to disaster (G)	0.5	
Disinfection system is off due to lack of disinfectant (C2)	0.0	
Inadequately treated water was introduced into the system (D3)	0.0	
E. coli detected and confirmed in repeat sample (F3)	0.0	
Viruses detected (eg., Hepatitis A, Norwalk) (F6)	0.0	
Protozoa detected (eg., Giardia, Cryptosporidium) (F7)	0.0	
Waterborne disease outbreak in the community (H)	0.0	

Figure 6: Distribution of Long Term BWAs by Reason (greater than or equal to five years duration)

Reason for Long-term BWAs (Code)	Percentage of Total Long-term BWAs	Distribution
Water supply has no disinfection system (A)	31.5	
No free chlorine residual detected (E2)	21.9	
Multiple reasons (any combination of codes)	15.7	
Disinfection system is off (C1)	10.9	
No free chlorine residual of 0.3 mg/L after 20 min. contact time (E1)	6.2	
Chlorination system is off due to taste/aesthetic considerations (B1)	5.5	
Chlorination system is off due to lack of funds to operate (B3)	5.5	
E. coli detected in initial sample(s) and other known problems (F4)	1.4	
Chlorination system is turned off due to perceived health risks (B2)	0.7	
Total coliforms detected and confirmed in repeat sample (F3)	0.7	
A cross-connection is discovered in the distribution system (D2)	0.0	
Insufficient residual disinfectant in water system (E3)	0.0	
Water supply system integrity compromised due to disaster (G)	0.0	
E. coli detected, repeat samples cannot be taken (F2)	0.0	
Total coliform detected and repeat samples cannot be taken (F2T)	0.0	
Disinfection system is off due to lack of disinfectant (C2)	0.0	
Inadequately treated water was introduced into the system (D3)	0.0	
Maintenance or repairs to water distribution system (D1)	0.0	
E. coli detected and confirmed in repeat sample (F5)	0.0	
Viruses detected (eg., Hepatitis A, Norwalk) (F6)	0.0	
Protozoa detected (eg., Giardia, Cryptosporidium) (F7)	0.0	
Waterborne disease outbreak in the community (H)	0.0	

The Department of Environment and Conservation's *Guidelines for the Design, Construction and Operation of Water and Sewerage Systems* require the following conditions to ensure the microbiological safety of drinking water:

1. All public water supply systems must be continuously disinfected.
2. All water entering the distribution system, after a minimum 20 minute contact time (CT), shall contain a residual disinfectant concentration of free chlorine of at least 0.3 mg/L, or equivalent CT value.
3. Water which is primarily disinfected by means other than chlorination must be provided with residual chlorine sufficient to maintain a detectable residual as per condition 4 below.
4. A detectable residual disinfectant (either free or total chlorine) must be maintained in all points in the distribution system.

Chemical and Physical Water Quality

The Department of Environment and Conservation's Water Resources Management Division monitors drinking water quality for a number of chemical and physical parameters. Samples for physical and chemical analysis are taken from the source water (lake, pond, river, reservoir, or well) and from the distribution system (tap samples). They are classified as:

- inorganics (metals, nutrients, physical parameters, and major ions)
- disinfection by-products (trihalomethanes and haloacetic acids)
- emerging or special parameters (currently radionuclides, carbon tetrachloride, benzene, and bromate)

The reasons for reported BWAs are:

- 28 communities have no disinfection system
- 14 communities have chlorination system turned off
- 89 communities have operational issues
- 14 communities have microbiological concerns
- 12 communities have multiple reasons

Historical data for most inorganic and disinfection by-product monitoring is analyzed prior to designing the annual drinking water sampling schedule in April of each year. The schedule is designed around drinking water quality issues, water treatment systems, disinfection systems, and special parameter sampling programs. The minimum monitoring requirements are:

- for tap water, inorganic samples are collected twice a year
- for source water, the department normally collects two samples for a water supply every second year

The department collects samples for disinfection by-products (DBPs) four times a year from surface water supplies that use chlorination as a disinfectant.

Regular DBPs monitored are trihalomethanes (THMs) and haloacetic acids (HAAs). Guidelines for these disinfection by-products are based on locational annual running averages which is an average value obtained from four samples per year over four seasons. These parameters typically do not form in groundwater because such sources typically contain minimal organic matter. Groundwater sampling for these parameters is generally only done for new public groundwater wells to gather baseline information. If DBPs are identified as an issue in a specific groundwater supply, then DBPs are monitored four times per year.

The number of samples taken per region is as follows:

Region	Source	Tap	THM	HAA	Total
Eastern	110	426	400	417	1,353
Western	112	341	375	418	1,246
Central	90	211	320	365	986
Labrador	21	59	84	84	248
Other (special)	5	0	0	0	5
Totals	338	1,037	1,179	1,284	3,838

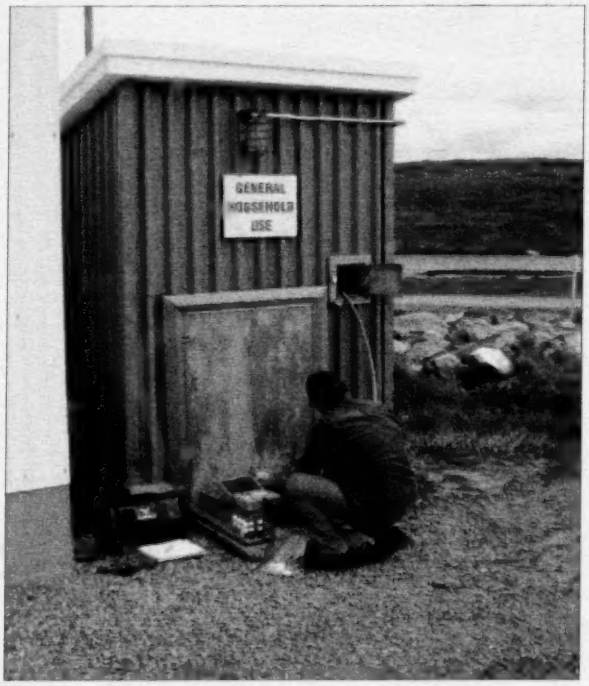
In 2009–10 the Department of Environment and Conservation collected 3,838 samples. This represents 96 percent of the samples that were scheduled for this fiscal year. The breakdown of these numbers are as follows:

Type of Sample	Scheduled	Collected	Percent
Tap Water Sample	1,062	1,037	98
THM Water Sample	1,226	1,179	96
HAA Water Sample	1,344	1,284	96
Source Water Sample	359	338	94
Total	3,991	3,838	96

For surface water systems with chlorination, tap water is sampled four times a year for DBPs. For tap water, inorganic samples are collected twice a year. For source water, two inorganic samples are collected every second year.

Samples not taken were due primarily to the following reasons:

- safety (source samples)
- town was not chlorinating at the time of sampling (THM and HAA samples)
- water supply not operating at the time of sampling (tap, THM and HAA samples)



WRMD staff sampling drinking water in Black Tickle-Domino, Labrador

The *Guidelines for Canadian Drinking Water Quality* can be found online at:

http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2010-sum_guide-res_recom/index-eng.php

Chemical and Physical Parameters: Analysis

In 2001, the province of Newfoundland and Labrador adopted the *Guidelines for Canadian Drinking Water Quality* (GCDWQ) to ensure clean and safe drinking water. These guidelines are published by Health Canada and are updated as necessary.

Following the collection of drinking water quality samples, the Department of Environment and Conservation submits the samples to an external accredited laboratory for analysis. The accredited designation ensures that the laboratory provides quality and competency in its sample analysis. The accredited laboratory is selected using a tendering process.

Chemical and Physical Parameters: Results

Results for chemical and physical parameters are sent to the Department of Environment and Conservation when laboratory analysis is complete. The department then evaluates the results by comparing them to guidelines as outlined in the GCDWQ. Source water results are compared to the GCDWQ to identify drinking water treatment needs and corrective measures that may need to be taken. Tap water samples are compared to the GCDWQ to identify exceedances in chemical and physical parameters that may pose a risk to human health or aesthetic approval of drinking water. Table 1 summarizes the tap water bacteriological, chemical and physical parameter exceedances for the 2009–10 fiscal year.

Filters for the treatment of drinking water

Table 1: Summary of Tap Water Bacteriological, Chemical and Physical Parameter Exceedances: 2009–10

Department	Exceedances		
Government Services	Bacteriological Parameters	*Escherichia coli*	212
		Total Coliforms	1222
Environment and Conservation	Chemical and Physical Parameters	Turbidity	64
		Arsenic	6
		Barium	2
		Lead	4
	Disinfection By-Products	Trihalomethanes (THMs)	167
		Haloacetic Acids (HAAs)	184
	Aesthetic Parameters	Colour	462
		pH	332
		Total Dissolved Solids	11
		Chloride	5
		Sodium	2
		Sulphate	3
		Copper	3
		Iron	87
		Manganese	72

Aesthetic Parameters

Aesthetic parameters pose no direct health or safety concerns, but may reduce the consumer's opinion of the quality of their drinking water based on taste, colour, and/or odour. Aesthetic parameters can also help determine the operational efficiency of a water system, and may highlight a need to make operational changes to the disinfection, treatment, or distribution systems.

In 2009–10, several aesthetic parameters exceeded the aesthetic objectives as outlined in the GCDWQ. Aesthetic parameter exceedances included: Colour, pH, Total Dissolved Solids, Chloride, Sodium, Sulphate, Copper, Iron and Manganese. Colour and pH continue to be the most common type of aesthetic parameter exceedances.

Contaminants

Contaminants are substances that are either known or suspected to cause adverse health effects when they are present in drinking water in amounts greater than the established maximum acceptable concentrations set by the GCDWQ. Treatment technologies for most contaminants are available to control the levels of contaminants in drinking water at an acceptable concentration.

In 2009–10, exceedances were detected for Arsenic, Barium and Lead. DBP's are the most common contaminants in the province and are attributed to chlorination of waters high in organic carbon content.

ENVC will assist communities with the assessment of their drinking water quality issues.

Data Management and Reporting

The large volume of data acquired during the implementation of the various components of the MBSAP must undergo a stringent quality assurance/quality control (QA/QC) process before it can be compiled, analyzed, and reported to the public. The WRMD strives to collect quality data and report it to the public in an open and timely manner.

The data management and reporting process ensures that decision makers and the general public have access to the necessary information about their drinking water quality. This allows the public to address any issues or concerns they have about their drinking water and for corrective actions.

In the 2009–10 fiscal year, 3,838 drinking water quality samples were collected by the department. Each sample provides a unique set of results and are stored in the ENVC drinking water quality database.

The database is a critical component in the management and reporting of drinking water quality data. It contains the results of every drinking water sample taken in the province, under the department's drinking water quality monitoring program. The database also stores other necessary information used in program management, such as status of protected public water supplies, drinking water quality index rankings, and special parameters.

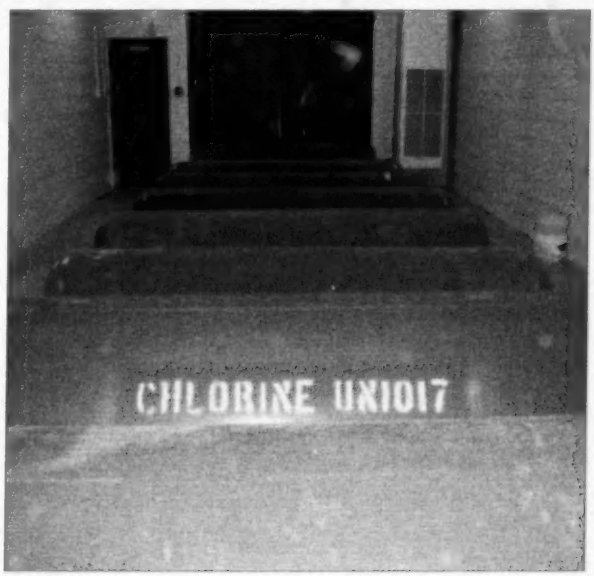
ENVC strives to provide free and transparent access to water quality data to the people of the province.

Data management is essential to ENVC's drinking water quality program and is constantly evolving to meet the needs of related programs. The WRMD continues to focus on using its enterprise–level database and web service technology to ensure that the most current and accurate data is available.

The drinking water quality search engine is a web-based application used by WRMD staff to review and analyze drinking water quality data. During the 2009–10 fiscal year, this application was redesigned to take advantage of new technologies and to incorporate evolving protocols in the drinking water quality monitoring program.

Reporting

As part of ENVC's commitment to report drinking water quality data to the public in an open and timely manner, WRMD distributes a number of reports for communities and the general public. Table 2 summarizes the reports used to communicate the results from programs related to drinking water quality.



Chlorine gas tonners, Exploits Regional water treatment plant

Water Resources Portal

On March 24, 2010, the Minister of the Department of Environment and Conservation launched the Newfoundland and Labrador Water Resources Portal at the 2010 Clean and Safe Drinking Water Workshop.

The Water Resources Portal will enhance the sharing of information with municipalities, industry, and provincial, and federal government departments, as well as numerous other stakeholders. It provides access to a variety of water resources geographic information, including public water supply area boundaries, drinking water quality sampling results, hydrometric stations, real-time stream flow graphs, and the location of dams and sewage outfalls.

The Water Resources Portal is a new provincial government Internet application that allows public access to a variety of water resources data, including information on the quality of drinking water. The Internet application is the most advanced provincial water resources portal of its kind in the country. The portal was developed with support from GeoConnections, a national partnership program that promotes on-demand access to geographic information. Other partners who contributed to this project are the City of Corner Brook, Town of Gander, Steady Brook Watershed Management Committee, Model Forest of Newfoundland and Labrador, and Memorial University of Newfoundland. Professional geographic information systems (GIS) services were provided by a local company, Tamarack Geographic Technologies.

The Newfoundland and Labrador Water Resources Portal is available at: http://maps.gov.nl.ca/water/

Protected public water supply areas can be viewed with Google Earth
http://www.env.gov.nl.ca/env/waterres/gis/index.html

The most frequent method of reporting used by ENVC is the seasonal drinking water quality report, sent out after each drinking water monitoring season. Depending on the type of sampling performed, these reports can contain results for samples collected at the source (for chemical and physical parameters) or at the tap (for chemical and physical parameters, THMs and HAAs). They compare sample results to the GCDWQ and note exceedances. The reports contain regular and exceedance water quality information for tap and source water. These reports also include two summary indices:

1. Water Quality Index (WQI)
2. Langlier Index

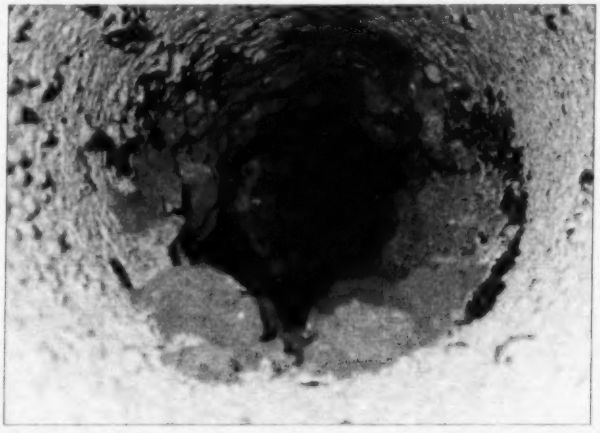
The WQI describes the condition of drinking water quality from a water supply and is based on the six most recent tap samples. The index describes the condition of a community's drinking water based on six categories ranging from excellent to poor. The drinking water in some communities is unable to be ranked due to the presence of a boil water advisory, contaminant exceedance, or significant gap in data required to be collected at the time of the WQI calculation. If the community is not ranked, then a water quality issue exists that needs to be addressed by the town.

The Langlier Index is one of the tools used by a water operator to stabilize water so that both the internal corrosion of the piping system and deposition of scale can be controlled. The Langlier Index can fluctuate frequently. Operators can control various parameters throughout the life of the distribution system to regulate Langlier Index readings, such as pH. The Langlier Index does not indicate the overall quality of drinking water in the system.

A second key reporting function is the contaminant exceedance reporting protocol. This protocol is activated when sample analysis indicates the presence of a contaminant in a concentration that is above the maximum acceptable concentration listed in the GCDWQ. The reporting protocol continues to be successful in ensuring prompt communication with communities and appropriate government departments.

Under the contaminant exceedance protocol, the laboratory performing the drinking water quality sample analysis is required to notify the department as soon as it detects any contaminant exceedances. The department sends the laboratory an immediate confirmation of receipt and initiates site analysis to determine if the contaminant exceedance requires a resample. Following the site analysis, an exceedance report is issued to the community explaining the exceedance and whether or not a resample is required. This report is copied to members of the departments of Government Services, Municipal Affairs, and Health and Community Services.

If a community is not ranked with the WQI, then a water quality issue exists that needs to be addressed by the community



Scaling on the inside of drinking water distribution piping

Table 2: Types of Public Reports Produced by ENVC

Type	Description
Exceedance Reports	Exceedance reports are provided to communities when a laboratory result is above the *Guidelines for Canadian Drinking Water Quality* for contaminant parameters. These reports are faxed and/or mailed to the affected community as soon as the department receives the results. In the 2009–10 fiscal year, 12 exceedance reports were sent out to communities.
Seasonal Drinking Water Quality Reports	All communities with public water supplies are provided with an interpreted report if seasonal monitoring has been conducted. These reports clearly indicate any parameters that exceed the *Guidelines for Canadian Drinking Water Quality*. The province recommends that communities post these reports in public locations. In the 2009–10 fiscal year, 1,063 seasonal reports were mailed out.
Annual Drinking Water Quality Reports	All communities with public water supplies are sent an annual interpreted report for all drinking water quality monitoring activities conducted during the calendar year. This report clearly indicates any parameters that exceed the *Guidelines for Canadian Drinking Water Quality*. The province recommends that communities post these reports in public places. In the 2009–10 fiscal year, 319 annual reports were mailed out.
Annual Drinking Water Safety in Newfoundland and Labrador Report	The Annual Drinking Water Safety in Newfoundland and Labrador Report has been published each year since 2001. It outlines accomplishments and activities under the Multi-Barrier Strategic Action Plan for drinking water safety in a particular fiscal year.
Web Documents on Drinking Water Quality	The WRMD's website is an important tool for communicating with the public. It is updated regularly with new information on drinking water quality and related topics. The "What's New" screen, which lists the most current information, is online at: *http://www.env.gov.nl.ca/env/waterres/whatsnew/index.html*

Inspection and Enforcement

Permits

Under the *Water Resources Act*, the Department of Environment and Conservation has the authority to issue various permits relating to different aspects of drinking water protection under the MBSAP. These include:

- permits to construct water and sewage works under Section 36 and 37 of the *Act*

Previous year's *Annual Drinking Water Safety in Newfoundland and Labrador Report* is available online at: *http://www.env.gov.nl.ca/env/waterres/reports/index.html*

- permits to operate water and sewage works under Section 38 of the *Act*
- permits for development activity in a protected water supply area under Section 39 of the *Act*
- non domestic well permits under Section 53 of the *Act*

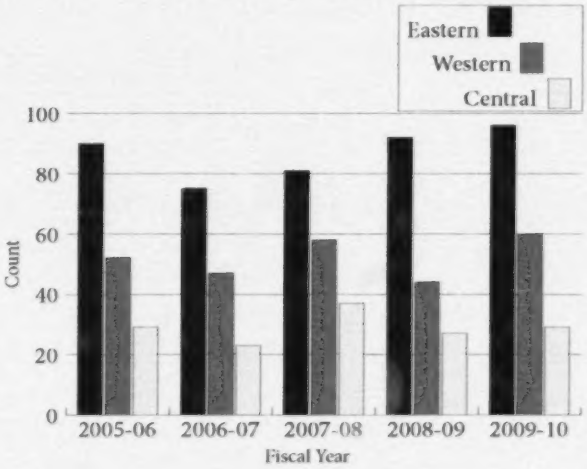
The Department of Environment and Conservation's permitting process ensures adequate review of proposed work to determine if it meets provincial standards and guidelines. Continuous inspection of projects and the enforcement of permits that have been issued by the department ensure that projects are in compliance with the conditions outlined in the permits.

The design and construction of all water and sewage infrastructure in the province requires an approval from the Minister of Environment and Conservation. The permit to construct is issued to the owner of the infrastructure and outlines standard requirements and any special conditions necessary to govern the installation of the works. The normal process is that a licensed engineer submits a design on behalf of a community which is reviewed for compliance with the Department of Environment and Conservation's *Guidelines for The Design, Construction and Operation of Water and Sewerage Systems*. If acceptable, a permit to construct is issued. During the 2009–10 fiscal year, the Department of Environment and Conservation issued 185 permits to construct. See Figure 7 for a historical comparison of permits to construct by region.

ENVC has the authority to issue various permits relating to different aspects of drinking water protection under the MBSAP.

The permit to operate is designed to focus the awareness of municipal government leaders and operators on the activities required to develop and practice proactive operation and maintenance of their drinking water infrastructure. Permits to operate are issued in four different areas: water distribution, water treatment, wastewater collection, and wastewater treatment.

Figure 7: Historical Comparison of Permits to Construct by Region



In the 2009–10 fiscal year, the department issued 8 permits to operate. The total number of active permits to operate, at the end of the 2009–10 fiscal year, was 336: 321 permits to operate water distribution systems, 15 permits to operate water treatment systems. Permits are also required, under Section 48 of the *Water Resources Act* to drill a non domestic well and must be obtained before construction begins. 23 non-domestic well permits were issued during the fiscal year for various uses which includes public water supplies.

Inspections/Investigations

The *Water Resources Act* states that a permit holder shall allow inspectors to carry out inspections of an activity for which a license or permit has been issued. Investigations can also occur once the Department of Environment and Conservation is made aware of a contravention of the *Water Resources Act* or associated regulations and permits.

The Department of Environment and Conservation requires that all public waterworks be maintained and operated sustainably, as prescribed by the *Water Resources Act*. Departmental staff conduct inspections of water supply systems under construction, groundwater wells being drilled, and activities taking place in protected water supplies to ensure that they comply with the terms and conditions of their permits.

Investigations are typically issue-specific. Additionally, the Minister may order studies, monitoring, or investigations for the purpose of collecting data and information that the Minister considers necessary in the interest of the conservation, development, control, improvement and proper utilization of water resources.

In the 2009–10 fiscal year, departmental staff carried out a total of 73 inspections/investigations. In addition, staff visit each public water supply two to four times a year during scheduled sampling work.

Inspection Type	Count
Water and Sewer Construction	66
Protected Surface Water Supplies	4
Water System Operation	2
Protected Groundwater Supplies	1
Total	73

Enforcement

One of ENVC's main goals is to ensure communities achieve clean and safe drinking water in a sustainable and efficient manner. When non-compliance with the conditions of a permit is reported, WRMD responds to enforce the regulations of the *Water Resources Act*.

Operator Education, Training, and Certification

Certified operators are integral to the proper operation and maintenance of the systems that supply clean and safe drinking water to the consumer. Through continuing education, training, and certification the Department of Environment and Conservation is addressing the need for qualified operators of drinking water treatment and distribution systems in this province.

Providing opportunities for ongoing training and education to operators of municipal drinking water systems is a major component of the MBSAP. Recognizing this, the Department of Environment and Conservation developed a unique approach to meet the training needs of operators across the province through the development of the Operator Education, Training, and Certification (OETC) program. The OETC program is the first of its kind in Canada, and was specifically designed to meet the needs of the province's small rural communities.

The OETC program provides operators with education and hands-on training opportunities that are focused on four key areas:

- job competency
- drinking water safety
- environmental protection
- infrastructure sustainability

A WRMD operator trainer conducting fire hydrant training

The OETC program is the first of its kind in Canada and was specifically designed to meet the needs of the province's small communities.

Operator Education

The education component of the OETC program takes place in a classroom-like setting. Seminars are designed to provide operators with the theory and knowledge that will allow them to successfully operate their water systems. Seminars are free of charge, and locations are chosen to minimize travel time and costs for participants.

Operator Training

The operator training program provides municipal drinking water system operators with hands-on training opportunities. The program utilizes three Mobile Training Units (MTUs) that have been equipped with various equipment and tools used in the operation and maintenance of drinking water systems.

- as this report is being prepared, there are 296 certified water and/or wastewater system operators in Newfoundland and Labrador

The curriculum of the education program focuses on topics such as:

- water distribution system basics
- water distribution system hydraulics
- water quality issues
- water treatment level I and level II

During the 2009–10 fiscal year, the OETC program launched a new education seminar that addresses the proper handling of chlorine and chlorine containers. Participation and interest in this course was high, and it will remain an integral component of the education curriculum. The need to provide operator education opportunities through the OETC program remains strong. Communities across the province, many of which are facing challenges of operator retirement and turnover, constantly need to educate new operators. The WRMD is committed to delivering its existing seminars on water distribution and water treatment in the coming years, and to expanding the curriculum as required. During the 2009–10 fiscal year, operators attended 36 water distribution seminars held in the province.

During 2009–10, the three operator trainers conducted 207 on-site training sessions throughout the province. These sessions were attended by a total of 318 operators.

Training sessions are delivered on-site in the operator's community to maximize accessibility to the training opportunities. During 2009–10, the province's three operator trainers conducted 207 on-site training sessions throughout the province. These sessions were attended by a total of 318 operators.

Currently the on-site training curriculum includes the following sessions:

- disinfection
- hypochlorination
- gas chlorination
- hydrant maintenance
- control valve maintenance
- pipe tapping
- leak detection
- distribution system flushing

Based on the demand from municipal water system operators, a new session, pH adjustment systems, is being developed for incorporation into the program curriculum. This session is expected to be completed by the end of the 2010–11 fiscal year.

WRMD staff members have been designing and constructing a water distribution system working model to augment their hands-on training program. This model will be used in conjunction with training sessions currently being delivered through the MTUs. The working model will be completed and in use for the 2010–11 fiscal year.

The Operator Education, Training & Certification Section Working Model

The Operator Education, Training, and Certification (OETC) Section of the WRMD provides on-site training sessions to operators of municipal drinking water systems. The section recognized the need for a portable training aid that was capable of demonstrating various water distribution system components under working conditions, to enhance the existing training curriculum. During the 2009–10 fiscal year, the construction of a water distribution system working model began.

The model is a portable small-scale water distribution system that uses a centrifugal pump to circulate water through the system. A chlorine gas injector or chemical feed pump can be used to demonstrate the chlorination process. The model is equipped with a pulse-type flow meter and an analog flow meter to demonstrate the methods of flow-proportional chlorination. The operator trainers use food colouring to simulate chlorine solutions, and the model's clear piping allows individuals to see how chemical feed pump settings such as stroke length and frequency can be used to help control disinfectant dosages.

The model also allows trainers to demonstrate the use of an air-relief valve, pressure-reducing valve, and a back-flow prevention valve. The valves are fully functional and can be adjusted to alter pressure and flow throughout the model. The model has several pressure gauges that are used when demonstrating various flow conditions and troubleshooting methods.

The on-site training sessions offered through the OETC program provide operators with the opportunity to handle and manipulate equipment. The addition of the working model to the available teaching tools will enhance this experience by allowing operators to use equipment under varying working conditions. The WRMD plans to construct two more models to ensure that municipal operators throughout the province will have the opportunity to benefit from this unique training tool.

A WRMD operator trainer explains the working model to students at the 2010 Stephenville Middle School Envirofest

Operator Certification

Certification of water operators in this province is a responsibility of the OETC program. Certification provides operators with an avenue for demonstrating their knowledge and commitment to their profession. It also provides communities with the assurance that their water systems are operated by qualified and knowledgeable personnel. As this report was being prepared, there were 296 certified water and/or wastewater operators in Newfoundland and Labrador. Current certification levels include:

- Water Distribution Operators (Class I, II, and III)
- Water Treatment Operators (Class I, II, III, and IV)
- Wastewater Collection Operators (Class I and II)
- Wastewater Treatment Operators (Class I and II)

During the 2010–11 fiscal year, ENVC will assume sole responsibility for the certification of water operators in this province. This transition of responsibility will add the following initiatives:

- developing an approved continuing education unit list that will be used during the evaluation processes for re-certification of operators every three years
- developing certification standards and exams for new classes, in very small water systems and small wastewater systems
- evaluating the certification needs for operators of potable water dispensing units
- forming a certification appeals board
- including a best practices requirement for operator certification

The next Clean and Safe Drinking Water Workshop is scheduled for March 22nd, 23rd and 24th, 2011 in Gander.

Annual Clean and Safe Drinking Water Workshop

The Annual Clean and Safe Drinking Water Workshop is open to all community operators and administrators. It brings together drinking water quality stakeholders and provides them with opportunities to learn about drinking water safety, to exchange information, and to share experiences. The presentations delivered during this event are carefully chosen to address specific challenges faced by small communities in providing clean and safe drinking water.

The theme of the 2010 Clean and Safe Drinking Water Workshop was "Bringing Ideas Together" and it took place on March 23rd, 24th and 25th, 2010 in Gander. The workshop attracted 326 participants from across the province and country. Copies of all presentations delivered as part of the workshop are available on the department's website. The annual event also includes a trade show exhibition which allows operators and municipal administrators to network with equipment suppliers from across the country. At the 2010 workshop, 17 companies showcased a variety of technologies and services related to water distribution and treatment. The Department of Municipal Affairs once again provided financial assistance to municipalities to alleviate travel costs associated with attending the workshop. Communities from the Island portion of the province that were approved for the subsidy were reimbursed up to $300, and communities from Labrador that were approved for the subsidy were reimbursed up to $600.

Future Initiatives

The OETC will be developing and introducing new education initiatives to its curriculum over the coming years. The development of additional education seminars will require training for OETC staff, as well as research and development of seminar materials. The following education seminars have been targeted for development:

- potable water dispensing unit operation and maintenance
- NL water resources portal training for communities
- orientation session for municipal staff

Other priority areas for future development include:

- delivering drinking water related education and on-site training sessions focused on new operators and communities facing drinking water challenges
- providing specialty courses to respond to the training needs of water operators throughout the province
- refining the working models for the design and construction of an additional two units for MTU's stationed in the Eastern and Central regions of Newfoundland and Labrador
- implementing the policy directive for the Newfoundland and Labrador water and wastewater operator certification program

Corrective Measures

The Level II components of the MBSAP just discussed provide an ongoing picture of drinking water supply, quality, and infrastructure. The issues identified requires the implementation of corrective actions to deal with these issues. Corrective measures can include structural, non-structural, or operational techniques and other best management practices.

There are five classes of corrective measures: policy, design, water system management, water treatment alternatives, and source alternatives. Table 3 shows the progress made in each category of corrective measure, including activities undertaken as part of the Rural Drinking Water Safety Initiative.

Table 3: Corrective Measures Undertaken: 2009–10

Type of Corrective Measure	Description
Policy	• completed year two of the Rural Drinking Water Safety Initiative • the Interdepartmental Committee on Drinking Water Safety for Small Water Systems met 6 times
Design	• *Guidelines for the Design, Construction and Operation of Water and Sewerage Systems was* updated • a study on performance evaluation of existing PWDUs was completed • 6 technical studies were initiated
Water System Management	• ongoing operator education, training and certification • approximately 57 permits to construct were issued relating to water system management (water main upgrades and replacement, pump house upgrades, chlorination system upgrades, new tanks, tank maintenance, addition of pH adjustment systems, and chlorine residual monitoring) • the study on the operation and maintenance of drinking water infrastructure was completed
Water Treatment Alternatives	• three permits to construct were issued relating to water treatment (water treatment plant upgrades, new water treatment plant, MIOX system addition) • 52 applications for funding for the installation of PWDUs were received by the Department of Municipal Affairs • Department of Municipal Affairs' completed project for the design of PWDUs
Source Alternatives	• Approximately 7 permits to construct issued relating to water sources (intake upgrades, new intake, reservoir upgrading, new source)

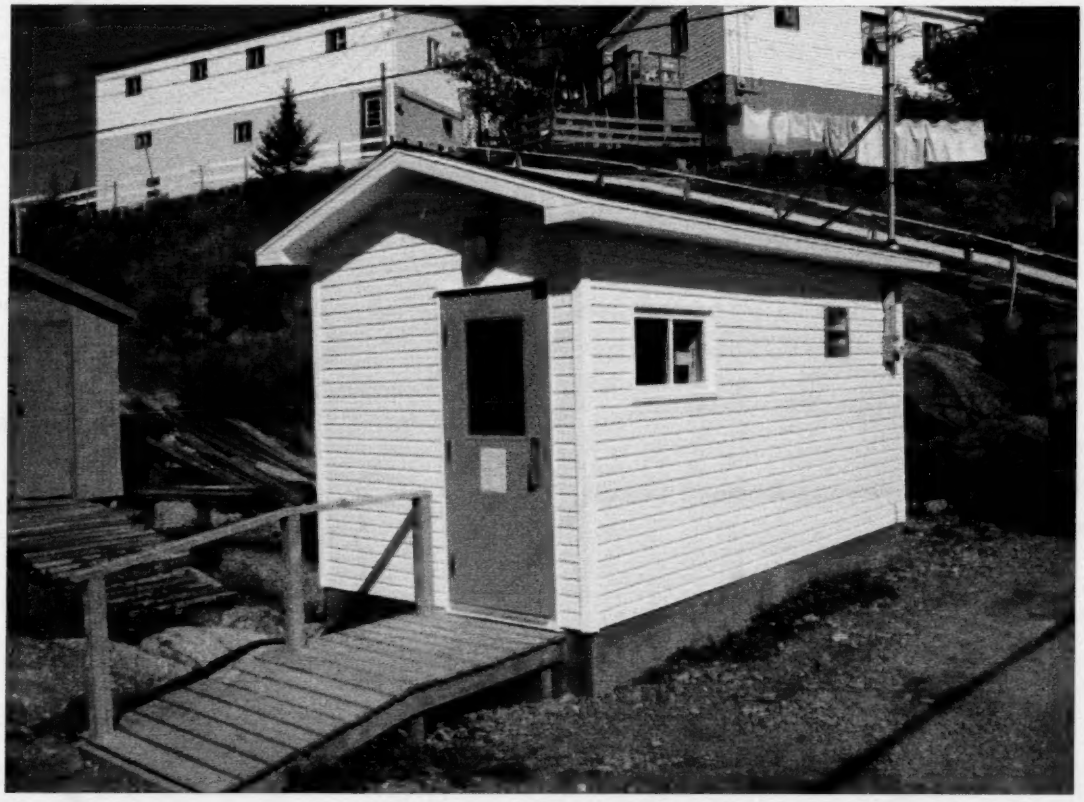
Rural Drinking Water Safety Initiative

The main objective of the Rural Drinking Water Safety Initiative is to address drinking water quality issues in small water systems in rural Newfoundland and Labrador.

PWDUs are used to address drinking water quality issues in such small water systems. Currently, 37 communities with a population of 500 or fewer are scheduled to receive a PWDU. Of these, 23 have agreed to having a PWDU installed, while 14 are undecided. Several communities were removed from consideration for reasons that included:

- the community wanted a full-scale water treatment plant
- the community wanted to be connected to a regional water supply
- the community could not provide adequate capital and/or regional funding
- the community preferred to upgrade existing treatment equipment
- residents were unlikely to use a PWDU
- the community preferred to change its drinking water source
- the PWDU would interfere with private enterprise or water sellers in the community

This fiscal year, one new PWDU was installed in the province, in the Town of Gaultois. ENVC encourages communities with small water systems to apply to have PWDUs installed.



Gaultois Community PWDU

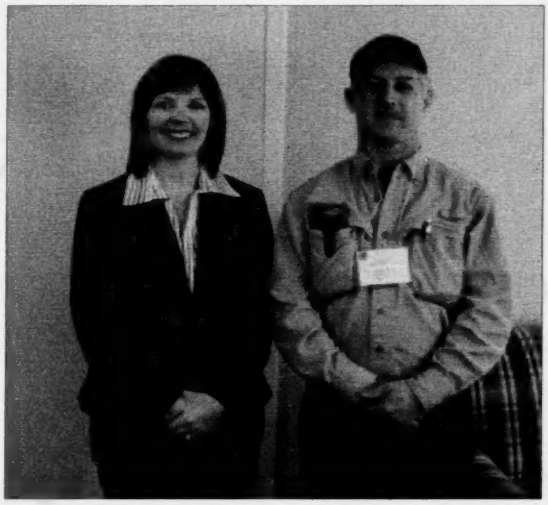
2010 Operator of the Year Awards
Recognizing the Dedication of Water System Operators in Newfoundland and Labrador

The Department of Environment and Conservation created the Operator of the Year Awards to recognize the outstanding dedication of municipal operators in providing residents with clean and safe drinking water. Presentation of the awards is the highlight of the Annual Clean and Safe Drinking Water Workshop.

Communities across the province were invited to nominate an operator they felt had made an outstanding contribution. When the deadline closed, 27 nominations had been received. Many nominations were accompanied by letters of support that detailed the efforts of the nominated operator.

The Volunteer Operator of the Year Award is presented annually to an individual who operates a municipal drinking water system without any monetary compensation. Dennis Penney was chosen as the 2010 Volunteer Operator of the Year. His nomination was submitted by the Local Service District of Canning's Cove, where he has been the Chairperson, Treasurer, and Water System Operator since 1992. Dennis' commitment to his community is evident to the residents of Canning's Cove on a daily basis, and he is dedicated to improving the community he holds close to his heart.

The 2010 Operator of the Year Award was presented to Dave Brewer, water system operator for the Town of Old Perlican. Dave is committed to providing the residents of his community with clean and safe drinking water. The Town of Old Perlican feels fortunate to have Dave as their operator, and are confident in his abilities as operator of their public drinking water system.



Minister Charlene Johnson with the 2010 Volunteer Operator of the Year–Dennis Penney of Canning's Cove

Minister Charlene Johnson with the 2010 Operator of the Year–Dave Brewer of Old Perlican

Level III

The effective management of the province's water resources ensures the supply of clean and safe drinking water for current consumers and for future generations. The management of drinking water is multifaceted and depends on the contribution of several levels of government as well as the public. The four components of level III of the MBSAP are:

1. legislative and policy frameworks
2. public involvement and awareness
3. guidelines, standards and objectives
4. research and development

Legislative and Policy Frameworks

The legislation that governs drinking water quality in the province includes the *Water Resources Act*, the *Municipal Affairs Act*, and the *Municipalities Act*. All of the legislation, policy directives, standards, and regulations are posted on the Province's website. These three Acts contain broadly stated initiatives:

- the *Water Resources Act* regulates the administration of water rights, the protection of public water supply areas, and a range of construction and development permits pertaining to drinking water infrastructure and development that may impact public water supplies
- the *Municipal Affairs Act* administers the management of waterworks
- the *Municipalities Act* grants powers to municipalities for the construction, operation, and maintenance of water systems and for the allocation of funds for this work

Government also introduces policy directives to provide more explicit direction.

View the Department of Environment and Conservation's website at:

www.env.gov.nl.ca/env/

Interdepartmental Cooperation

The provincial government's efforts to provide clean and safe drinking water are the result of the combined contributions of four departments: the Department of Environment and Conservation (acting as the lead agency), and the Departments of Health and Community Services, Government Services, and Municipal Affairs. Each department is responsible for one or more components of the MBSAP. Their efforts are coordinated by an interdepartmental committee of deputy ministers, which is chaired by the Deputy Minister of the Department of Environment and Conservation. The committee's work is supported by the Interdepartmental Safe Drinking Water Technical Working Group, which was formed in June, 2000. The working group is chaired by the Department of Environment and Conservation, and includes representatives from the Departments of Health and Community Services, Government Services, and Municipal Affairs. Medical Officers of Health and representatives from the Public Health Laboratory are also members of the working group. The working group met four times in 2009–10, with all activities reported to the chair of the Steering Committee of Senior Government Officials. In 2009–10, the committee focused on the QA/QC of BWAs, and the implementation of the MBSAP for drinking water safety in Newfoundland and Labrador.

Public Involvement and Awareness

The Department of Environment and Conservation continues to provide easily accessible and timely drinking water quality information to the public. The department's website is a major tool for increasing public awareness and encouraging public involvement. Watershed management committees are a way the public can participate in efforts to ensure clean and safe drinking water supplies. They are excellent forums in which stakeholders can voice opinions and concerns about land management and water quality issues in their watershed areas. The establishment of watershed management committees furthers the Department of Environment and Conservation's goal of increasing public involvement and awareness of drinking water safety issues.

The Department of Environment and Conservation can provide presentations for public information.

Staff of the WRMD often make presentations on a range of topics to technical working groups, conferences, post-secondary education classes, municipalities, and other interest groups.

The drinking water program is responsible for all public information requests. All public drinking water supplies and water quality data inquiries can be submitted via email to the WRMD at: protectedwatersupply@gov.nl.ca for surface water inquiries, or groundwaterinfo@gov.nl.ca for groundwater inquiries, or waterandsewer@gov.nl.ca for community water and wastewater system inquiries.

Guidelines, Standards, and Objectives

To ensure clean and safe drinking water, the Department of Environment and Conservation sets drinking water safety guidelines, standards, and objectives, and regularly reviews and updates them to address current issues and challenges.

Research and Development

In order to stay on top of current and emerging issues that affect drinking water safety, the Department of Environment and Conservation undertakes several research and development activities each year. The radiological monitoring of all public groundwater supplies was completed in 2009–10. The final report describing the results of this study will be completed in 2010.

A number of studies under the Rural Drinking Water Safety Initiative were implemented during the 2009–10 fiscal year:

- Study on Performance Evaluation of Existing Potable Water Dispensing Units and Recommendations for Design and Operational Guidelines
- Study on Operation and Maintenance of Drinking Water Infrastructure in Newfoundland and Labrador.

Out of Sight, Out of Mind?

It's not unusual for community members to be unaware of where their tap water actually comes from, especially in communities with groundwater supplies. Groundwater supplies are often located in or near the communities that they serve. However, because they are located in the ground, they can be easily missed. They are often not perceived as sensitive areas, or as being susceptible to contamination.

Anything that occurs on land can directly affect groundwater, just as easily as it can contaminate surface water. Therefore the Department of Environment and Conservation recommends that communities and residents become familiar with their groundwater sources, and apply to have them designated as protected wellheads under the protected public water supply program.

A Protected Wellhead with identification banding

Inquiries can be submitted via email at: *protectedwatersupply@gov.nl.ca* for surface water items, or *groundwaterinfo@gov.nl.ca* for groundwater items, or *waterandsewer@gov.nl.ca* for community water and wastewater

The Path Forward

Department of Environment and Conservation

The Department of Environment and Conservation will continue to pursue its commitment to develop and strengthen all levels and components of the Multi-Barrier Strategic Action Plan.

The department's drinking water monitoring activities for the 2010–11 fiscal year are planned as follows:

3,895 drinking water quality samples scheduled for collection and analysis.

- 449 source water samples, which will be analyzed for inorganic chemical parameters.
- 1,042 tap water samples, which will be analyzed for inorganic chemical parameters.
- 1,210 tap water samples, which will be analyzed for trihalomethanes.
- 1,194 tap water samples, which will be analyzed for haloacetic acids

QA/QC sampling will continue as part of the drinking water quality monitoring program. In addition, to ensure that monitoring activities are carried out consistently across all regions, a quality control program is being initiated for 2010–11. This program involves the observation of procedures and protocols followed by all staff involved in the drinking water quality monitoring program. This program will be a continuing component of the drinking water quality QA/QC.

The department will also continue to work on its Rural Drinking Water Safety Initiative with the remainder of potable water dispensing units (PWDUs) to be installed in September 2010 to March 2011. The department encourages communities with small water systems to apply to have PWDUs installed.

The department will continue to provide education and hands-on training opportunities to water system operators. The development of new and updated curriculum to address the education and training needs of communities across the province is scheduled for 2010–11. This will include the continuation of new seminars such as the "Proper Handling of Chlorine and Chlorine Containers, and new training sessions such as "pH Adjustment Systems." Training sessions to assist communities with the understanding of their Drinking Water Quality Reports is still under development.

The department is looking forward to the completion of the Water Distribution System Working Model and the incorporation of this tool into its operator training program. The development of new initiatives related to the certification of water operators in Newfoundland and Labrador will be a priority for 2010–11 and 2011-12.

The 2011 Clean and Safe Drinking Water Workshop is scheduled for March 22nd, 23rd and 24th 2011, in Gander. The department looks forward to sharing information and experiences with the various stakeholders involved in providing clean and safe drinking water to the people of the province.

Department of Municipal Affairs

The Department of Municipal Affairs will continue to financially support requests from communities for the provision of water related infrastructure. Appropriate water treatment technology to enable communities to meet the GCDWQ continues to be a priority for capital funding assistance. In this regard, the department has allocated $18 million in the years 2008-11 to fund requests under the province's Rural Drinking Water Safety Initiative. This initiative outlines several options to improve drinking water safety based on a comprehensive evaluation of every public water supply in the province. A significant component of this initiative includes the installation of potable water dispensing units. Under the Rural Drinking Water Safety Initiative, the first installation of a PWDU will be underway in the coming months and positive results are anticipated.

The department will also continue to provide financial assistance to communities wishing to have

representatives attend training, workshops and certification courses relating to drinking water safety.

Cost effective approaches with regard to regionalization of operational and maintenance services will be encouraged in the way of both advisory and financial support. The department is encouraging communities to avail of the benefits of the regionalization services initiative of the provincial government.

Department of Government Services

Through its bacteriological water monitoring program, the Department of Government Services (GSC) helps ensure that public drinking water is protected from waterborne diseases and is safe for consumption. Its ongoing high level of public water sample collection is an indication of the department's commitment to a satisfactory level of bacteriological water monitoring and compliance with levels recommended in the province's standards and the *Guidelines for Canadian Drinking Water Quality*.

In 2008-09, new staff members were placed in GSC offices throughout the province. Part of their assigned duties is to assist the Department's Environmental Health Officers to collect water samples, further securing the safety of the province's public water supplies. These technicians will continue to provide this valuable service in 2010–11.

The department is also interested in improving the surveillance of drinking water that is accessible to the public through means other than municipal/public water supplies, such as via semi-public and institutional supplies. It will continue discussions with the Department of Environment and Conservation on this issue.

As in the past, the Department of Government Services will also continue to partner with the Department of Health and Community Services and the Regional Health Authorities. It is important to ensure that Environmental Health Officers can access the highest standard of professional development in their field, particularly in bacteriological water monitoring. Consequently, support for professional development in this area will continue, in cooperation with the Canadian Institute of Public Health Inspectors (Newfoundland and Labrador branch).

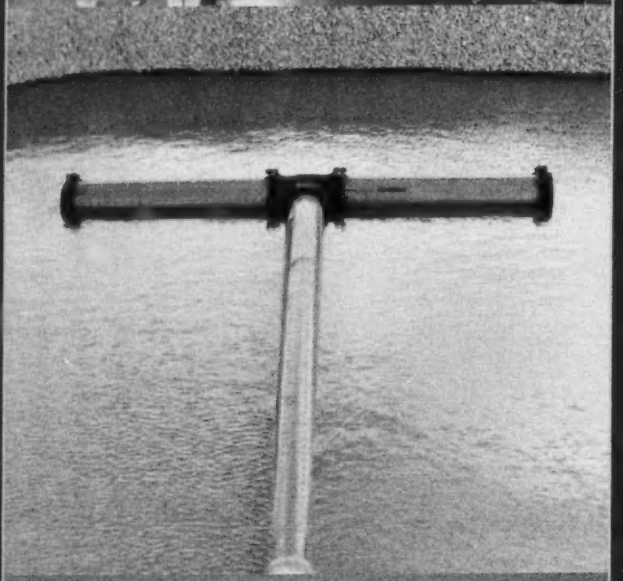
Department of Health and Community Services

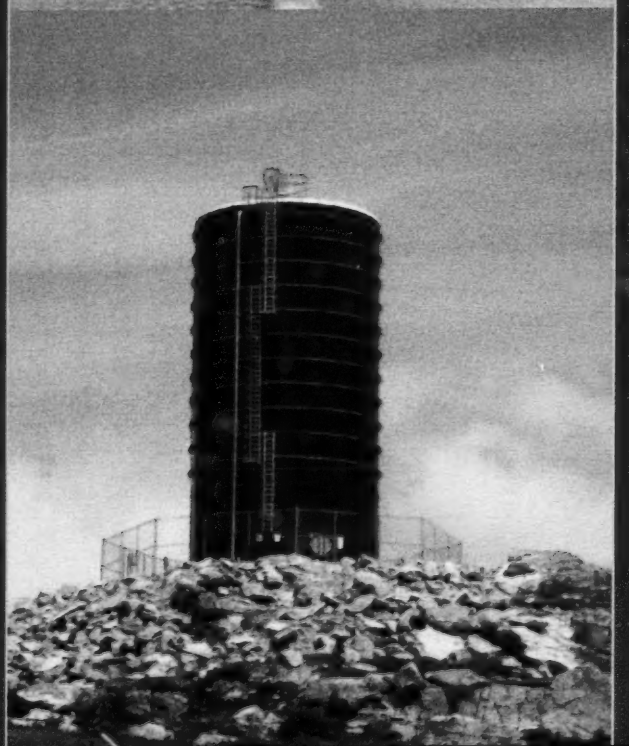
Through the Provincial Public Health Laboratory and regional testing locations, water samples from municipal and private supplies are tested for *E. coli* and total coliform bacteria. In 2009–10 the Department of Health and Community Services continued to support and fund this bacteriological water quality monitoring and testing program.

In 2010–11 the Department of Health and Community Services and the four Regional Health Authorities will continue their ongoing drinking water safety initiatives by working collaboratively with provincial and municipal partners to enhance health protection efforts and disease prevention initiatives that are related to drinking water quality. They will continue to:

- Provide policy and technical support to Environmental Health Officers who perform bacteriological water quality monitoring and interpret bacteriological water quality test results
- Review and enhance drinking water safety promotional materials, where necessary
- Provide health-related advice to municipal leaders and residents where unsatisfactory water quality in public water supplies has been identified
- Partner with the Department of Government Services and the Canadian Institute of Public Health Inspectors (Newfoundland and Labrador branch) to provide Public Health Inspectors with continuing professional development that is related to drinking water quality
- Work on the national and inter-provincial levels on safe drinking water initiatives such as the Federal-Provincial Committee on Health and the Environment.

Annual Report 2010





Newfoundland Labrador

Environment and Conservation